DOCUMENT RESUME

ED 097 911 IR 001 285

AUTHOR Muzio, Joseph N.; And Others
TITLE Audio-Tutorial Project: An Audio-Tutorial Approach to Human Anatomy and Physiology.
INSTITUTION Kingsborough Community Coll., Brooklyn, N.Y.
PUB DATE Nov 74
NOTE 9p.; Paper presented at the Annual Audio-Tutorial System Conference (6th, San Francisco, California, November 1974)

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS Anatomy; Audiovisual Aids; *Audiovisual Instruction; Biology; *Biology Instruction; *Community Colleges; Formative Evaluation; *Individualized Instruction; Medical Education; *Nurses; Phonotape Recordings; Program Evaluation; Teaching Methods
IDENTIFIERS *Kingsborough Community College; New York City

ABSTRACT

A two course sequence on human anatomy and physiology using the audiotutorial method of instruction was developed for use by nursing students and other students in the health or medical fields at the Kingsborough Community College in New York. The project was motivated by the problems of often underprepared students coming to learn a new field and by the time constraints caused by students' part-time status. An elementary biology course was divided into 28 learning modules (14 per semester). The program included a student study guide, taped lessons, small and large assembly sessions, an independent learning center with 30 carrels, and performance tests for each module. An analysis of the program is being planned that will use student questionnaires, an analysis of student time, and a comparison with students taking the human anatomy and physiology courses without audio tutorial instruction. The audio tutorial approach is an ideal method of fostering individualized learning, particularly for those students who have experienced academic difficulty. (WH)

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AUDIO-TUTORIAL PROJECT: AN AUDIO-TUTORIAL APPROACH TO HUMAN ANATOMY AND PHYSIOLOGY.

PROFESSORS JOSEPH N. MUZIO, PETER PILCHMAN, AND PETER A. LANZETTA.

KINGSBOROUGH COMMUNITY COLLEGE OF THE CITY UNIVERSITY OF NEW YORK.

DEPARTMENT OF BIOLOGICAL SCIENCES

INTRODUCTION AND OBJECTIVES

During the past decade, a number of educators have examined new and different learning and teaching approaches. Such interest has been stimulated by a variety of factors, among them:

a. changes in student populations, particularly larger numbers of students who are more exposed to multi-media communications and who have difficulty in reading, writing, and language skills,

b. needs for more flexible educational systems in response to changing demands of society,

c. desire by some educators to explore new methods that might assist them in being more effective in their instruction,

d. continual development of knowledge in academic disciplines, coupled with developments in multi-media technology, and

e. soaring educational costs, especially in programs involving laboratory equipment and materials.

One such approach has been the audio-tutorial (AT) module method. The AT teaching-learning strategy is a valid and effective technique that has been used in numerous science courses and other subject areas. (1,2,3).

1. McKeachie, W.S. Procedures and Techniques of Teaching: A Survey of Experimental Studies. The American College, Nevitt Sanford (ed.), New York: Wiley and Sons, Inc., 1966.

2. Creager, J.G., and D.L. Murray, (Eds.). The Use of Modules in College Biology Teaching, Washington, D.C.: The Commission on Undergraduate Education in the Biological Sciences, 1971.

3. Postlethwait, S.N., J.Novak, and H.T. Murray, Jr. The Audio-Tutorial Approach to Learning. Second Edition.1971. Burgess Publishing Co., Minneapolis, Minn.

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A one-year college course in human anatomy and physiology for open admission students planning to enter, primarily, nursing, paramedical, health education, and recreation programs, presents various educational problems. The introduction of new terminology and course content based on the interrelationships of design and function and the various body systems, the development of effective visual materials, and the identification of sound laboratory experiences, are a few such problems that should be noted.

In addition to these factors, there are other crucial factors in the development of educational programs that cannot be ignored nor taken lightly. Students with varied educational backgrounds and with personal problems related to financial needs that result in many of them holding full or part-time jobs, and commuting long distances, present difficulties that have a direct bearing on educational achievement. Also, problems related to administrative interpretations of teacher-student ratios, and obtaining adequate instructional facilities and supportive services, are other major influences on educational developments.

For students who enter open-enrollment programs, and have prior learning shortcomings in science, reading, and writing experiences, and are confronted with other difficulties such as those cited above, it is our belief that the use of AT teaching-learning modalities in human anatomy and physiology will promote student opportunity for success.

The primary objective of this AT project is to promote student success in human anatomy and physiology through the introduction of specific teaching and learning strategies. The objective will be achieved in the course by:

1. Precisely designing student performance objectives in behavioral terms.

2. Providing audio-tutorial experiences that are based on these objectives.

3. Offering educational units, or modules, in Anatomy and Physiology, that can be achieved at varied rates of learning.

4. Utilizing multi-media approaches that promote subject mastery.

5. Providing weekly examinations based directly on the student performance objectives; and student evaluations on each module so that the modules can be modified in response to student-identified areas of unclarity and/or weakness.

6. Designing a learning environment that is conducive to concentration, repetition, and positiveness, independent of a rigid time schedule and lock-step grouping.

The one year course, Biology 11-12, has been divided into 28 learning modules (14 per semester). Each module contains a student study guide composed of student performance objectives, summary and rationale, reading materials, experiments, diagrams, self-tests, a glossary of appropriate terms, and other supportive materials (films, demonstrations, etc.) that are part of the individual learning carrels and the demonstration areas in the learning center. The student study guides have been jointly prepared by the three instructors in the project and students use these study guides instead of a laboratory manual. Also an audiotape based on a script written by the instructors, guides the students through each module. The tape integrates the student study guide and learning center experiences, and clearly is <u>not</u> meant to be a lecture on tape. We have now completed 18 modules, all of Biology 11 (1st Semester) and four for Biology 12 (2d Semester). The remaining modules will be completed during the Fall, 1974, and Spring, 1975, Semester.

DESCRIPTION OF A-T APPROACH

Beginning in the Fall, 1974, the program was implemented for approximately 130 students in the following manner: four sections of Biology 11, the first semester of the one year Human Anatomy and Physiology course, are using the audio-tutorial learning approach. The weekly schedule for each student is two hours in a general assembly (48 students), one hour in a tutorial group (16 students), and three hours in the Independent Learning Center where the student uses the audio-tutorial approach (24 students). The overall design is similar to that used by Dr. Samuel Postlethwait and others of Purdue University. (1)

At the beginning of the Fall, 1974 Semester, the students received a booklet, Student Information, which outlined the educational format, explanation of examination and grading procedures, reading assignments, and suggestions as to how they can succeed in this course. The booklet focuses on positive achievement of students and their instructors' interest in assisting them.

The focus in the Audio-Tutorial Learning Center sessions is for students to work independently, to use the student study guide, the audio tape, and other supportive materials to assist in achieving the stated objectives, and to work on the various related anatomy and physiology projects that are to be done at the learning station and demonstration tables in the Learning Center. As in other courses, the instructor is available to assist the student in any way possible. In addition to this scheduled Learning Center session, the student can use the Center during open hours, and during other class sessions with the instructor's permission. There are 15 open hours per week and the Center is available Monday

(1) Postlethwait, S.N., J.Novak, and H.T.Murray, Jr. The Audio-Tutorial Approach to Learning. Second Edition. 1971. Burgess Publishing Co., Minneapolis, Minn.

to Thursday from 9 AM to 5 PM, and Friday from 9 AM to 3 PM. Students are required to log in and out whenever they use the Learning Center.

The General Assembly Sessions function in the conventional lecture-discussion format. The instructor provides lectures, offers time for student discussions and questions that will clarify the week's objectives, and uses other educational techniques (films, slides, guest speakers) to assist the students. The instructor focuses on those topics he believes are pertinent for basic understanding in order to achieve the objectives. The General Assembly Session is a vital component of the course, since it is at these sessions that the Learning Center modules are further developed and clarified.

The Small Assembly Session provides students with an opportunity to meet with their instructor and a smaller number of students in a more informal classroom atmosphere than the General Assembly Session. During these sessions, students, in a round table format, make scheduled oral presentations and reports on topics related to the modules, discuss anatomy and physiology topics that they and their instructor believe need further clarification, and take practical quizzes based on the Learning Center experiments, etc.

Each week there is a 32-item multiple choice examination on the student performance objectives for that particular module. If a student does not successfully pass the examination, he is required to repeat the module in the Learning Center, and also obtain additional instructional assistance in the following week. Another form of the examination is administered and, if the student does not succeed on the second attempt, he will receive an Incomplete (Inc.) for that module. The student continues with the remainder of the course and will be required to repeat that module in the following semester. If a student does not

succeed in more than two modules, while free to continue in the course, he will repeat the entire course. Biology 12, the second semester, will function on a similar basis beginning with the Spring, 1975 Semester.

There are 30 carrels in the Learning Center, an adequate number so that students can spend additional hours reviewing the modules as often as they like, and repeating those modules that were not successfully completed.

Each week, students anonymously evaluate that week's module. The questionnaire is based on a rating scale used at Kingsborough Community College for course and instructor evaluation, and is related to the Learning Center experiences and the study guide. It also contains several open-ended questions related to suggestions for additions, deletions, improvements, and other comments.

The three instructors directly involved in this project meet each week to critique the module, propose revisions, and discuss the progress of the entire project. The entire Department of Biological Sciences is invited to join and to participate. There are also periodic discussions with representatives from the Departments of English and Nursing to consider reading materials, subject content, and approaches based on an interdisciplinary articulation.

By promoting student success and capitalizing on success as a motivating force for students planning to enter the nursing profession, this program will expedite the student's goals. Rather than having confusion, failures, withdrawals, and students repeating a course several times, this program provides students with experiences that will give them credit for those units successfully completed. Only those specific units not successfully completed will have to be repeated.

With additional instructional assistance, coupled with student repetition of structured units, there is ample evidence from other established programs that failure rates can be markedly decreased and students moved through the program at a faster and more efficient rate.

PROGRAM EVALUATION

The following factors are being considered in evaluating the AT Program's effectiveness:

1. Following each AT experience, a questionnaire is completed by the student. (The plan calls for 14 modules/semester, thus a total of 28 module questionnaires for the one year Biology 11-12 sequence.)
2. Analysis of the time spent by students in the Learning Center and their academic performance. Simply stated, is there a relationship between the amount of time using the Center and the grades achieved?
3. Through discussions with Dr. Morris Rabinowitz, KCC Coordinator of Instructional Research, testing and measurements will be done to insure that the program's effectiveness is properly evaluated.
4. From the standpoint of successful completion of the course, a comparison of a comparable number of KCC students experiencing the standard approach in Human Anatomy and Physiology and those using the Audio-Tutorial technique.
5. One section of 24 students using the standard lecture-laboratory approach has for its instructor one of the three individuals developing and using the AT Program. This instructor uses the student Study Guide (objectives, materials, etc.) as his basis of teaching, but without the other AT program. The students are given the same module tests as provided in the four sections of the AT Project. Student success in this section will be compared with the student success in the four AT sections.

6. Comparison of subsequent academic performance in the related nursing courses: Fundamentals of Nursing, Maternal and Child Health, Medicine and Surgery, with the same control group cited in (3).
7. The use of a follow-up letter that will be sent to students after completion of the one year course in Human Anatomy and Physiology to determine student perceptions of:
   (a) course relevance to other nursing and instructional areas,
   (b) course content,
   (c) suggestions and criticisms of Audio-Tutorial methods, and
   (d) impact of AT self-paced instruction on the student's approach to learning.
8. Comparison of costs for AT approach; compilation of instructional, facility, materials, and student costs.

PRESENT AND FUTURE APPLICATIONS OF THIS APPROACH

While the audio-tutorial Human Anatomy and Physiology approach is primarily for nursing students, it is available to other career students at the College. Specifically, students planning to enter recreation programs, can use particular units to better understand the human body; pre-physical therapy students seeking more information on human anatomy and physiology prior to entering the next step of their career programs; secretarial students who plan to enter a medical or associated field could use the units related to terminology, or specific body systems. Furthermore, biology instructors who use the standard laboratory-lecture approach and identify students experiencing academic difficulty in Human Anatomy and Physiology could refer those students to the Audio-Tutorial Learning

Center, and they could use the modules as supportive instructional programs. The developed modules are applicable for other career programs and the various branches of SUNY and CUNY (1), especially those focusing on self-directed and "open university" concepts. As education becomes recognized as a lifetime process, and individuals change careers or return to school after a number of life experiences, this audio-tutorial approach is an ideal method of fostering individual learning. As one examines our society, there will continue to be developing forces for the training of qualified personnel in the nursing and allied health sciences professions.

Those of us who have been involved in this project would like to emphasize that we view the audio-tutorial approach as an alternative method of instruction. We have spent a considerable amount of time and energy over the past two years in planning and developing the anatomy and physiology modules and we are most enthusiastic about using them and evaluating their effectiveness. By no means are we suggesting that this learning and teaching methodology should be the only approach for Kingsborough Community College students or for students at other institutions. Each instructor must come to terms with the ever present problem of how to be a more effective educator, and it is this concern that has led several of us to explore the audio-tutorial approach.

(1) State University of New York, and City University of New York.

Partially funded by the New York State Department of Education, Vocational Education Act.

The authors express their appreciation to Mr. Jack Phillips, Director, Media Center, and Ms. Janice Purnhagen, Technician, for their continual advice and assistance.

Authors' Mailing Address:
Kingsborough Community College
Oriental Boulevard, Manhattan Beach
Brooklyn, New York 12235